NEWS REPORT

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NATIONAL RESEARCH COUNCIL

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NEWS REPORT

National Academy of Sciences — National Research Council

VOLUME VI — *March-April 1956* — NUMBER 2

United States Participation in International Science[1]

WALLACE W. ATWOOD, JR.
Director, Office of International Relations

IN RECENT years the scientists of the United States have been participating in more and more international scientific activities. Some of these activities are conceived, planned, and carried out by international scientific organizations to which the Academy–Research Council adheres on behalf of the United States. Others are sponsored by inter-governmental organizations in which the United States is a member. This article deals with a few of these international activities and describes the role of the Academy–Research Council in helping to achieve appropriate United States participation.

The broad pattern of international cooperation in science is complex. An attempt to present this pattern in chart form is shown in figure 1. The whole story is not shown in this chart, neither can it be fully presented in this manner. The chart simply identifies some of the national and international groups involved in furthering cooperation among scientists and among nations and indicates some of the channels of communication which are known to exist.

The Academy–Research Council plays an important part in this operation because it is responsible for guiding and facilitating United States participation in many international scientific programs. In other countries, similar functions are performed by the leading academies of science and national research councils. In the United Kingdom, it is the Royal Society which assumes primary responsibility; in the Netherlands, the Royal Academy of Sciences; in Germany, the Forschungsgemeinschaft; and in Japan, the Science Council. Sometimes these scientific organizations are governmental and sometimes they are private.

Figure 1 shows the position of the Academy–Research Council in the overall picture. Scientists from universities, government agencies, industry, and from the various national scientific societies, research laboratories, and foundations actively participate. These people, more than 3,000 annually, serve on committees, boards, and panels established within the framework of the Academy–Research Council. Duly appointed representatives of societies and of government agencies are members and take part in the formulation of policy. Through this widespread participation of the scientists of the United States, the Academy–Research Council obtains the advice and counsel required to guide its many programs, including national participation in international science.

[1] Condensed from Vice Presidential address delivered before Section E of the American Association for the Advancement of Science, Atlanta, Ga., December 27, 1955.

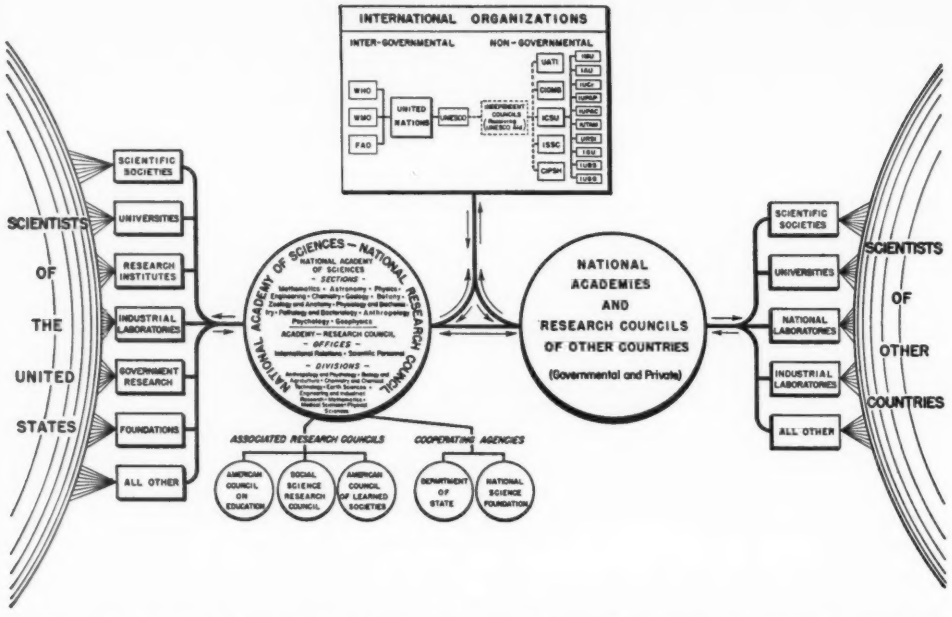


Figure 1.—The role of national academies and research councils in furthering national participation in international science. The pattern of organization presented here facilitates direct communication between scientists and scientific groups. Arrows indicate the movement of people and ideas in the continuous process of achieving cooperation and coordination.

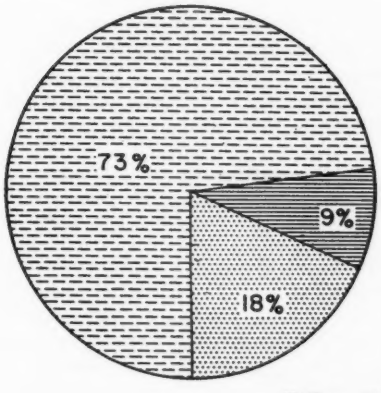
At first glance this pattern might appear adequate because it provides the best scientific guidance which the nation can supply. However, there are other factors to be considered such as the harmonizing of international scientific activities with our nation's foreign policy and the coordination of national science programs with those undertaken through international cooperative effort. Because these factors are important and because United States participation in international science must serve the nation as well as science, the Academy–Research Council has encouraged joint consideration of all international scientific matters by a Policy Committee composed of representatives from the Department of State, the National Science Foundation, and the Academy–Research Council. This Policy Committee, under the chairmanship of the Foreign Secretary of the National Academy of Sciences, guides the program of the Office of International Relations.

With few exceptions the scientists of other countries participate in international scientific organizations in much the same way as the scientists of the United States. The chief difference is that academies of science and research councils in other countries are frequently governmental. This difference poses no difficulties to the scientists unless governmental control of science is exercised. Most of the governmental academies and research councils provide the same freedom which we ourselves enjoy: leading scientists serve on the national delegations to international meetings and they are free to express their views and to offer cooperation in the furtherance of scientific undertakings.

According to recent figures there are 55 international organizations exclusive of those in medicine and engineering, which are concerned primarily with furthering research in the natural sciences. The status of these organizations is shown in figure 2. Fifty or over ninety percent of this select group are non-governmental; 40 of the 50 are affiliated with the International Council of Scientific Unions.

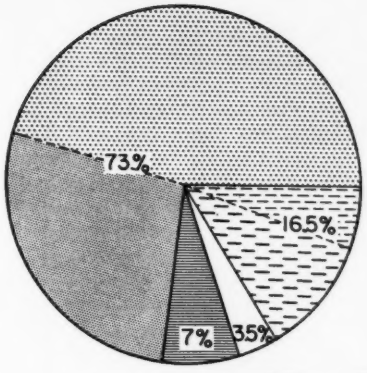
The fact that most international scientific organizations are non-governmental is no accident but instead reflects the very nature of science and the wish of scientists to be free from political and other governmental directive influences. However, it does not follow that non-governmental organizations are out of touch or out of harmony with the governments of their member countries. On the contrary, they work closely with governmental groups and in many instances receive substantial financial and other support from national governments.

How do the scientists of the United States participate in these various international organizations? Figure 3 shows that the United States adheres to 49 of the 50 non-governmental organizations and to 4 of the 5 inter-governmental organizations. Adherence to 40 of the 55 is achieved through the Academy–Research Council. In 25 cases national committees or divisional committees have been established by the Academy–Research Council to effect adherence and to plan United States participation. In 15 cases participation is not organized and is achieved only through ad hoc groups of scientists called together by the subject-matter divisions of the Academy–Research Council.



	NO. OF ORGANIZATIONS	PER CENT OF TOTAL
Non-Governmental; affiliated with ICSU and/or its member unions	40	73%
Non-Governmental; independent	10	18%
Inter-Governmental	5	9%
	55	100%

Figure 2.—Status of international scientific organizations (natural sciences only).



	NO. OF ORGANIZATIONS	PER CENT OF TOTAL
Through Academy-Research Council (organized)	25	45.5%
Through Academy-Research Council (not organized)	15	27.5%
Outside Academy-Research Council (organized)	3	5.5%
Outside Academy-Research Council (not organized)	6	11%
Through United States Gov't.	4	7%
No United States participation	2	3.5%
	55	100%

Figure 3.—United States participation in international scientific organizations (natural sciences only).

At this point is may be useful to describe briefly these national committees which guide United States participation in international scientific organizations. With few exceptions, each of these committees has a short constitution which states the purposes of the committee, establishes a system of rotation of membership which will insure at all times appropriate representation from national scientific societies, educational institutions, industry and government, and prescribes general by-laws to govern its operation. The principal functions of these national committees are to keep their scientific colleagues informed concerning programs sponsored by their respective organizations, to arrange for adequate representation at international meetings, and to otherwise implement United States participation.

An indication of the extent of United States participation in international scientific organizations is revealed in part by the record of United States delegates attending international scientific meetings.

This record has been kept for the past 6 years by the Academy–Research Council and is shown in figure 4. Of course, the attendance of United States scientists at international meetings is much larger than the number of appointed delegates. The total attendance probably exceeds 1,000 annually.

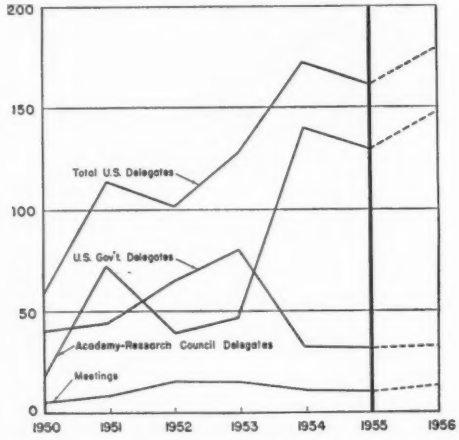


Figure 4.—Number of United States delegates at international scientific meetings (natural sciences only).

The only significant development revealed in the 6-year record occurred between 1953 and 1954 when the number of United States Government delegates dropped from 80 to 32, while the Academy–Research Council delegates increased from 47 to 140. The drop was occasioned by a change in Department of State policy relative to appointment of delegates to meetings of international non-governmental organizations. The increase in Academy–Research Council delegates reflects a counter-move to provide scientific representation at international meetings formerly covered by Government-appointed delegates and to strengthen United States participation generally.

Having examined the mechanics of participation in international scientific organizations, it may be useful to review briefly three specific activities in which the United States is participating, namely: *1*) The International Council of Scientific Unions (ICSU), 2) The International Geophysical Year (IGY), and *3*) the United Nations Educational, Scientific and Cultural Organization (Unesco).

International Council of Scientific Unions

The International Council of Scientific Unions is not a large organization. It is essentially an administrative body composed of representatives of 13 unions and 40 member countries. The unions, which constitute the scientific membership, are autonomous organizations, each of which has several sections or associations dealing with special fields of science. The role of ICSU is that of a coordinating and facilitating body. It does not direct the activities of its member unions.

National adherence to ICSU as well as to all of its member unions is almost always accomplished through the leading academy of science or national research council in the country concerned. In the United States the Academy–Research Council adheres to ICSU on behalf of the scientists and the Government. This adherence goes back to 1918 when the National Academy of Sciences joined with other academies of science in forming the International Research Council which later became the International Council of Scientific Unions.

In furthering international scientific research, ICSU relies upon its member unions and upon its national adhering organizations. Relations with governments are arranged through the academies and research councils which serve as the national adhering organizations. In this manner ICSU has obtained the assistance of governments in the furtherance of important scientific investigations.

International Geophysical Year

In September 1950 the Joint Commission on the Ionosphere recommended that the scientists of the world make simultaneous observations in 1957–58 of certain geophysical phenomena which would be well displayed at that time. The plan was conceived as a follow-up of the first and second Polar Years held in 1882–83 and 1932–33. The recommendation of the Joint Commission was endorsed by the sponsoring Unions, and at the General Assembly of ICSU held at Amsterdam in October 1952 a special committee was authorized to plan an international geophysical year to be carried out in 1957–58.

In December of 1952 the President of the National Academy of Sciences received a letter from the Secretary-General of ICSU inviting the United States to establish a national committee to plan a program of geophysical investigations which the United States would be willing to carry out as its part of an international geophysical year. On February 10, 1953, a United States National Committee was formed with a membership of 16 scientists, most of them directly concerned with research in geophysics. In less than four months a proposed United States program was drafted and a delegation was selected to attend the organizational meeting of the Special Committee for the IGY established by ICSU.

Today the International Geophysical Year is a 250-million-dollar affair with hundreds of scientists in the United States alone actively participating in planning a worldwide program of geophysical observations. The Academy–Research Council sought the cooperation of the National Science Foundation in securing funds for this undertaking and to date $12,000,000 have been obtained from the United States Congress. It is quite likely that this sum will be materially increased before the end of this session of Congress.

Not only the United States is interested in this adventure into the study of the earth, the oceans, and the upper atmosphere, but 43 other countries are equally excited. Each of these countries has planned a national program, and all are working together to achieve a fully coordinated program to which all nations can contribute. From this cooperative effort, scientists throughout the world will obtain valuable data which will help them to unravel some of the mysteries of the planet Earth. They will learn more about weather and weather forecasting, about communications through the upper atmosphere, about the oceans, and about the size, shape, and peculiarities of the earth itself.

Quite aside from any scientific knowledge to be obtained from the IGY there is the valuable experience of nations working together. Never before have so many scientists from so many countries joined hands in search for the truth. The experiences gained during this worldwide exercise should contribute to world understanding and help to break down the barriers of ignorance and distrust which keep the peoples of the world apart. The IGY will furnish new opportunities for cooperation among scientists and among governments.

Launching of the IGY would have faced almost insurmountable difficulties if there had been no ICSU. It was the unions and the national members of ICSU which gave immediate life to this undertaking and obtained the scientific and financial support required for its success.

United Nations Educational, Scientific and Cultural Organization

In 1946 the Academy–Research Council formed a Committee on Science in Unesco composed of nationally known scientists deeply interested in international affairs. The chief function of this Committee is to advise the U. S. National Commission for Unesco on all aspects of the Unesco natural sciences program. The Committee periodically reviews the program and budget of the natural sciences program and reports its findings and recommendations to the U. S. Department of State. In this manner and in other ways the Committee has sought to guide United States participation in the science program of Unesco.

During the 10 years of its existence, Unesco has undertaken to do many things, perhaps too many. Some of its efforts have been of doubtful value while others have paid important dividends. In the latter category is Unesco's financial support of ICSU and its member unions, amounting to nearly $200,000 annually, which permitted these organizations to re-establish themselves following World War II and to greatly extend their important functions of furthering international cooperation in science. Scientists of all countries, including the United States, approve of this support and recognize it as one of the most appropriate ways in which Unesco can strengthen science internationally. Furthermore, it is the most economical way for Unesco to achieve its own objectives in the area of the sciences.

The current United States member of the Executive Board of Unesco is a scientist, Dr. Athelstan F. Spilhaus, Dean of the Institute of Technology at the University of

Minnesota. He, perhaps better than anyone else in the United States, is qualified to speak on the role of Unesco in the sciences. At the Fifth National Conference in Cincinnati sponsored by the U. S. National Commission for Unesco he said:

> Unesco should strive to incorporate and secure the cooperation of voluntary international organizations in all the fundamental disciplines with which it is concerned. Cooperation is by nature voluntary, inter-governmental organizations can only supplement and assist the spontaneous working together of scientists of various nations and in different fields. * * *
>
> Science cannot be organized from the top; research cannot be directed; and in the whole history of scientific activity between nations our experience is that it is generated in the minds of scientists and grows best through their joint spontaneous action. Unesco should not attempt to provide ideas to scientists or to over-organize them, but should seek ways to strengthen and build existing international non-governmental scientific organizations to the point where their independent continuance is ensured.
>
> Unesco's role is as a trigger mechanism, a catalyst which sets off the great forces of voluntary national and individual effort and self-help. In science Unesco should not *do* research; it should not attempt to provide ideas—it should devote itself to helping others to use their magnificent ideas and research more widely on the international scene.

The concept of Unesco's role in science, expressed so well in the above quotation from Dr. Spilhaus, has been voiced by the scientists of other countries. It is a sound concept which should guide the work of Unesco in the natural sciences.

From the foregoing account of ICSU, the IGY, and Unesco, it is apparent that the task of achieving adequate and appropriate United States participation in international scientific activities is no small assignment. It is one that cannot be performed by any one organization. Instead, it is one that must be accomplished through cooperation and coordination among all interested parties.

It is a pleasure to report that major progress has been made in effecting this cooperation and coordination. The first step was taken three years ago when the Academy–Research Council formed the Policy Committee for the Office of International Relations and included among its members the Science Adviser in the Department of State and the Director of the National Science Foundation. One of the important functions of this Committee has been to harmonize the interests of governmental and private scientific groups in international scientific activities.

The second step was taken in 1955 when the Academy–Research Council decided to expand its program in international relations and was supported in this move by the Ford Foundation, the Department of State, and the National Science Foundation. Financial assistance for an initial period of five years has been provided. This means that the national committees for the various international organizations can carry forward their work with greater effectiveness and a larger staff can be provided to deal with the steadily increasing number of problems associated with international science. It means much more than this because it establishes for the first time a well-rounded program to further United States participation in international science, a program which will be guided by the scientists of the country and supported by both private and governmental funds.

ANNUAL MEETING NATIONAL ACADEMY OF SCIENCES

The National Academy of Sciences will hold its ninety-third Annual Meeting at the Academy building, April 23–25. Sessions for the presentation of scientific papers will be held on Monday, April 23, and Wednesday, April 25. There will be a short business meeting before the first scientific session on Monday morning. The section meetings will be held Monday afternoon after the scientific sessions. Tuesday will be devoted to the election of officers and new members and to general Academy business. The scientific sessions will be open to the public.

In addition to four sessions of contributed papers there will be four sessions devoted to symposia of invited papers, including a symposium on solar and terrestrial relationships.

On Monday evening there will be a special program for the presentation of seven Academy medals. The medalists will be introduced and present short addresses pertaining to their respective fields of scientific inquiry. A reception for the medalists, members, and guests and a program of scientific demonstrations and exhibits will follow the formal presentations. The Academy members and their associates will provide the exhibits and the aim of the program will be to demonstrate significant current scientific and technical developments.

The Academy dinner for members and guests will be held Tuesday evening, April 24, at the Hotel Statler. Dr. Alexander von Muralt, Rector of the University of Bern, President of the Fonds Nationale Suisse de la Recherche Scientifique, and former President of the Société Helvétique des Sciences Naturelles, will deliver the main address. John E. Burchard, President of the American Academy of Arts and Sciences, Boston, will be an honored guest and also speak.

On Wednesday evening there will be the customary buffet supper for members only served in the auditorium of the Academy building to provide an opportunity for informal discussion concerning Academy policies and activities.

ANNOUNCEMENT OF EXPANDED PROGRAM IN INTERNATIONAL RELATIONS

Detlev W. Bronk, President of the National Academy of Sciences, announced the receipt of a grant from the Ford Foundation in partial support of an expanded program in international relations to be carried out by the Academy–Research Council. These funds totaling $400,000 will be expended over a period of approximately five years during which time the Academy–Research Council will seek continuing support for its program from other sources.

In accepting the Ford Foundation grant President Bronk wrote as follows:

> We are grateful to the Foundation for making possible a scale of activity in the international relations of science that has been beyond our financial grasp heretofore.
>
> It will be a source of great satisfaction to us to be able to take increased advantage of the continuing opportunities that we have to further not only science but also the many other aspects of human and cultural understanding among nations.

The program to be supported by the Ford Foundation grant is designed to strengthen United States participation in international scientific activities and to further cooperation among scientists and among nations. The funds will be used among other purposes to facilitate the work of United States national committees of international scientific organizations, to support international exchange visits of outstanding United States and foreign scientists, and to augment the staff of the Office of International Relations.

The grant provided by the Ford Foundation will permit the Academy–Research Council to strengthen significantly its present program in international relations and to support certain new activities. It will not, however, solve one of the pressing problems, namely: support of travel to international scientific meetings. Each year some funds will be available for this purpose but they will be needed primarily to provide travel aid to scientists who have been selected to represent the United States at important meetings of international organizations to which the United States

adheres and for whom travel aid is not available from other sources. A committee to advise on the award of grants will be established to review all proposals.

Responsibility for guidance of the program rests with the Policy Committee of the Office of International Relations. This Committee, under the chairmanship of John G. Kirkwood, Foreign Secretary of the Academy, is composed of the President of the Academy, the Director of the National Science Foundation, the Science Adviser in the U. S. Department of State, and three members-at-large. One of the important functions of this Committee, in addition to guiding the Academy–Research Council program in international relations, is to harmonize the interests of governmental and private scientific groups in international scientific activities. Direction of the program is the responsibility of the Director of the Office of International Relations.

In addition to the 5-year grant from the Ford Foundation and the continuing financial and other assistance provided by the Academy–Research Council, the program in international relations is supported by the U. S. Department of State and the National Science Foundation. This additional support, although assigned to specific projects, increases the overall ability of the Academy–Research Council to assist international activities of concern to the scientists and facilitates coordination of nongovernmental and governmental efforts to further international cooperation in science. The lead article in this issue of NEWS REPORT describes some of these international activities and explains the role of the Academy–Research Council in helping to achieve appropriate United States participation.

LECTURE BY ROBERT STONELEY

The fourth lecture in the Academy–Research Council series was delivered on January 10 by Robert Stoneley, Fellow of the Royal Society, Reader in Theoretical Geophysics at the University of Cambridge, and visiting Professor of Geophysics at American University. Dr. Stoneley chose as his subject "The Interior of the Earth."

Before the advent of seismology, the overall character of the earth was known but not its internal structure. From astronomical data it had been shown that the material of the earth was condensed toward the center. The average density had been computed but not the distribution of materials of different densities.

Seismology had shown that the earth is layered with marked increases in density toward the center. The middle of the earth does not transmit distortional waves, and so it may be regarded as having some of the properties of a fluid. An inner core of about one-fifth the radius of the earth has a density comparable to that of iron under high pressure, but whether this inner core is solid or fluid is uncertain. It is supposed that the outer part of the earth corresponds in composition to ultrabasic rocks. The combination of seismic velocities with the value of the moment of inertia determines the distribution of densities in the outer part or mantle.

Information about the layers composing the mantle is obtained mainly from seismology, correlated with the distribution of crustal materials as conceived by geologists. Observations of gravity and of the rates of outflow of heat provide valuable cross checks. It is likely that the continental layer is some 35 kilometers thick and is granitic in composition. In places there is an underlying layer of material approximating basalt in composition, and below this is the ultrabasic material of the mantle. The general figure for total thickness of the continental layer is supported by the known rates of generation of radioactive heat in continental materials.

Seismic prospecting of the ocean bottom by means of explosions at sea indicate a different layering for the ocean floor. Beneath a few kilometers of sediments there is a basic layer about 5 kilometers thick resting on the ultrabasic rocks of the mantle. This composition agrees with the general results of gravity observations over the world, namely that the mass in any vertical column is about the same. An outstanding puzzle is how to explain the observed temperature gradient in the sea bottom below which the radioactivity of the rocks seems

quite insufficient to explain the net heat outflow which is of the same order as over the continent.

At a depth of 400–500 kilometers, there seems to be a change in properties: this is indicated by the travel-time of earthquake waves, the change in electrical conductivity needed to explain the short-period variations in the earth's magnetic field, and the occurrence of "deep-focus earthquakes" down to this depth. This has been attributed to a change in crystal lattice but there is scope for more detailed investigation of this and the low-velocity layers that appear to exist in the continents.

COMMITTEE ON FIRE RESEARCH

The Division of Engineering and Industrial Research has established a Committee on Fire Research under contract with the Federal Civil Defense Administration. The Committee is a development of the Exploratory Conference on Mass Fire and Fire Storm Research held on May 24, 1955, at the suggestion of the U. S. Forest Service and the Federal Civil Defense Administration. The exploratory conference found that the problems of fighting fire in peace and war are vitally important and that scientific research is needed to improve the present knowledge and understanding of fires and their spread. The Committee will endeavor to find new ways to prevent and control wartime and peacetime fires.

The Fire Research Conference, being established as a part of the Committee's activity, will provide effective liaison and a channel of communication between the Committee proper and organizations and individuals interested in the application of new and old techniques in the study and control of fire.

The Committee will advise the Federal Civil Defense Administration on the formulation of a fire research program, on the acceptability of fire research proposals, on the placement of research projects, and on the progress of research projects and the adequacy and significance of the research reports.

Some of the aspects with which the Committee and the Conference will be concerned are:

1) Research in the fundamental natural laws involved in the origin and spread of fires.
2) Investigations of methods to improve the use of water as an extinguishing agent.
3) Models for the study of large fires.
4) Laboratory studies fundamental to field studies of natural fires or large model fires.
5) Meteorological factors involved in fire development and fire spread.
6) New and unconventional methods of fire control and prevention.
7) Means for the collection of measurements for the study of large fires.
8) Coordination of existing programs to prevent unnecessary duplication and to assure that efficient use is made of the information resulting from current and previous programs.

The present membership of the Committee is as follows:

HOYT C. HOTTEL, Massachusetts Institute of Technology, *Chairman*
WILLIAM H. AVERY, Applied Physics Laboratory, Johns Hopkins University
HORATIO BOND, National Fire Protection Association
ARTHUR BROWN, U. S. Department of Agriculture
JOSEPH GRUMER, U. S. Bureau of Mines
WALTER T. OLSON, National Advisory Committee for Aeronautics
HOWARD W. EMMONS, Harvard University
JOHN B. MACAULEY, Deputy Assistant Secretary of Defense for Research and Development

VISITING MATHEMATICIANS

The Division of Mathematics has prepared a list of foreign mathematicians currently visiting the United States. This list, which has been distributed to all Division and Committee members as well as other interested individuals, includes not only the length of time the visitors will spend in this country but also the names of the institutions at which they are located. The 56 visitors are spending their time at 22 institutions and have come from 18 countries.

Free copies of this list are available upon request from the Division of Mathematics, National Academy of Sciences–National Research Council. The Division plans to revise the list from time to time as additional information is received about other visiting mathematicians.

MATERIALS ADVISORY BOARD

At the special request of the Department of Defense the Materials Advisory Board has begun a study of the technical content and organization of the materials research program of the Department. A special advisory committee has been set up which will be responsible for the study and for the development of such recommendations as may be deemed necessary. J. R. Townsend, Chairman of the Materials Advisory Board, is serving as chairman of the Committee and Francis C. Frary, Vice Chairman of the Board, is vice chairman of the Committee. The following Academy members are serving on the Committee:

E. C. BAIN, U. S. Steel Corporation
E. K. BOLTON, formerly with E. I. du Pont de Nemours & Company
JOHN CHIPMAN, Massachusetts Institute of Technology
PAUL D. FOOTE, formerly with Gulf Research and Development Company
ZAY JEFFRIES, formerly with General Electric Company
C. K. LEITH, Emeritus Professor of Economic Geology, University of Wisconsin
CARL S. MARVEL, University of Illinois

Fourteen technical panels have been established under the special committee to make the detailed surveys necessary in specific fields. The panels and their chairmen are as follows:

High temperature—A. J. Herzig, Climax Molybdenum Company of Michigan
Ferrous—E. C. Smith, Republic Steel Corporation
Non-ferrous (excepting titanium)—A. J. Phillips, American Smelting and Refining Company
Titanium—F. C. Frary, Consultant with Aluminum Company of America
Magnetic—Richard M. Bozorth, Bell Telephone Laboratories
Semi-conductors—L. W. Apker, Research Laboratory General Electric Company
Miscellaneous—Walter C. Voss, Consultant for Architectural Construction & Materials
Deterioration and Prevention—F. L. LaQue, International Nickel Company
Plastics—Gordon Kline, National Bureau of Standards
Elastomers—R. F. Dunbrook, Firestone Tire and Rubber Company
Textiles—W. J. Hamburger, Fabric Research Laboratories, Inc.
Dielectrics—D. A. McLean, Bell Telephone Laboratories
Adhesives—L. J. Markwardt, Forest Products Laboratory
Ceramics and Refractories—Hans Thurnauer, Minnesota Mining and Manufacturing Company

USA NATIONAL COMMITTEE INTERNATIONAL GEOGRAPHICAL UNION

On April 24, 1955, the Governing Board of the Academy–Research Council approved a constitution for the U. S. National Committee of the International Geographical Union. In accordance with the section on membership of this constitution, the Committee was reorganized so as to include wider representation of the several fields of geography. The Chairman, Wallace W. Atwood, Jr., called the first meeting of the new Committee on January 25 at the Academy–Research Council building. The first action of the Committee was to select three members-at-large and to elect Clarence F. Jones of Northwestern University Vice Chairman and Walter W. Ristow of the Library of Congress Secretary-Treasurer of the Committee. The full membership of the Committee and the organizations represented are as follows:

Association of American Geographers
CLARENCE F. JONES, Northwestern University
CHAUNCY D. HARRIS, University of Chicago
GUIDO G. WEIGAND, Rutgers University
EDWIN J. FOSCUE, Southern Methodist University

American Geographical Society
OSBORN M. MILLER, Head of the Department of Surveys and Maps

National Geographic Society
NEWMAN BUMSTEAD, Assistant Chief Cartographer

United States Department of State
ARTHUR L. BURT, Special Assistant for Maps

United States Department of Defense
ROGER A. PRIOR, Staff Assistant, Coordinating Committee on General Sciences

United States Department of the Interior
GEORGE D. WHITMORE, Chief of Technical Staff, Topographic Division, U. S. Geological Survey

Members-at-large
WARREN J. NYSTROM, U. S. Chamber of Commerce
SAMUEL VAN VALKENBURG, Clark University
WALTER W. RISTOW, Library of Congress

Ex-Officio Members
GEORGE B. CRESSEY, Vice President of the International Geographical Union
GEORGE H. T. KIMBLE, Secretary-Treasurer of the International Geographical Union
RICHARD J. RUSSELL, Chairman, Division of Earth Sciences
WALLACE W. ATWOOD, JR., Director, Office of International Relations

The main work of the Committee centered around preparations for United States participation in the 18th International Geographical Congress to be held in Rio de Janeiro, August 9–18, 1956. Nominations for the United States delegation to the General Assembly of the Union and the Congress were made and the duties and responsibilities of the delegates were outlined. The Committee appointed Arthur L. Burt, Newman Bumstead, and Osborn M. Miller to serve as the Subcommittee on Exhibits, so that United States cartographic work will be properly represented at the Congress in Rio.

Considerable discussion revolved around ways and means of reducing travel costs for United States geographers attending the Rio Congress. The plan adopted by the Committee has been distributed to all members of the Association of American Geographers. Inquiries concerning the plan may be addressed to the Chairman of the Committee.

A financial report on the General Assembly and Congress held in Washington in 1952 and a progress report on the publication of the Proceedings were also presented by the Chairman.

CONFERENCE ON PHARMACOTHERAPY IN MENTAL ILLNESS

A conference on validation of research on pharmacotherapy in mental illness will be held at the Hotel Statler in Washington, D. C., on September 22, 1956, under the joint sponsorship of the Academy–Research Council, the National Institute of Mental Health, and the American Psychiatric Association, with R. W. Gerard as leader. The conference will be based on presentations of several ad hoc working groups. Their reports on the methodological, theoretical, and administrative problems involved in evaluating tranquilizing and other drugs, both at preclinical and clinical levels, will be reviewed in closed committee sessions during the two preceding days. Those interested in attending the conference should write to the Executive Secretary of the project, Jonathan O. Cole, National Academy of Sciences, 2101 Constitution Avenue, Washington 25, D. C.

LECTURE BY FARRINGTON DANIELS

"Thermoluminescence of Crystals" was the subject of the fifth lecture in the Academy–Research Council series given on January 24 by Farrington Daniels, Professor of Chemistry at the University of Wisconsin, past president of the American Chemical Society, and a member of the Academy and of its Governing Board.

Thermoluminescence is the emission of light by a solid as it is warmed up from a low temperature to some temperature less than that necessary to cause incandescence. Unlike incandescence thermoluminescence is not an equilibrium process, but the thermally activated release of energy stored in the solid. Once the stored energy is "boiled out" by warming a thermoluminescent material, a repetition of the warming cycle will yield no further light emission.

The energy stored in thermoluminescent materials in most cases comes from ultraviolet light or X-, alpha, beta, or gamma rays to which they have been previously exposed. The thermoluminescence of minerals is presumably due to their exposure to the radiation from traces of radioactive impurities over geological periods of time. These energetic radiations produce free electrons inside the crystal. Most of these free electrons return to their point of origin very quickly, emitting fluorescent light in the return process. A small fraction of the freed electrons, however, are "trapped" at defects in the crystal and require the assistance of thermal vibrations before they can escape from their traps and return to the ground state. The rate of escape of electrons from their traps, and therefore the intensity of the thermoluminescence, depends on the temperature. With traps of a single depth the thermoluminescence will increase in brightness as the temperature is raised until a maximum brightness is attained, and then diminish to zero as all the trapped electrons are released. A plot of thermoluminescence brightness vs. temperature—the so-called "glow curve"—will show a single "glow peak," from which the trap depth may be computed. If traps of different depth are present, the glow curve will exhibit a corresponding number of glow

peaks. Crystal defects at which electrons can be trapped include vacant negative ion sites, interstitial cations, impurities, dislocations and internal cracks, all of which are found in normal crystals.

Dr. Daniels discussed the possibility of using the thermoluminescence of minerals as a stratigraphic tool and for age determinations, as well as the possibiity of using the phenomenon for dosimetry of ionizing radiations and for identification or characterization of materials. In general these applications must be made with caution, because of the complexity of the phenomenon and its sensitivity to a variety of disturbing influences, such as pressure, grinding, unknown impurities, and the prior thermal history of the sample.

ORBIT OF MAN-MADE SATELLITE

The earth satellite program planned by the United States National Committee for the International Geophysical Year was reported in the last issue of NEWS REPORT (Vol. 6, No. 1, 1956). On January 27 the National Committee announced the orbit the satellite will follow as it revolves around the earth.

The satellite will be launched from the Patrick Air Force Base on the east coast of Florida at Cape Canaveral (approximate longitude and latitude, 28°28′ N., 80°33′ W.) and will take an orbit inclined approximately 40 degrees from the equator. This angle of inclination will permit the satellite to revolve around the earth in a latitude range of about 40 degrees on either side of the equator. The satellite will travel eastward in an elliptical path, circling the earth 16 times in 24 hours. Because the path is elliptical and because the satellite will encounter minor perturbations in orbit, there will be about a 25-degree displacement on each revolution. This means that after one revolution, the satellite will appear 25 degrees west of its launching site, after two revolutions it will appear 50 degrees west, and so on. Thus in the course of many revolutions, the orbit of the satellite will shift within a band between 40 degrees north and 40 degrees south of the earth's equator. This shift will permit the scientists of a large number of nations to take measurements and to make observations.

In the planned orbit the satellite will be observable from the United States, Central and South America, and Africa; southern Europe and possibly some regions in mid-northern latitudes; the Balkans and Middle East; the Caspian Sea and part of the U.S.S.R.; Pakistan, China, Japan, India, and several other countries in Asia in the mid-northern latitudes; and from Indonesia, Australia, and New Zealand. The United States National Committee hopes that later satellites may be launched so as to permit scientists of additional nations also to participate in the study.

PROSTHETICS RESEARCH BOARD

In recognition of the changing character of the artificial limbs program, the Advisory Committee on Artificial Limbs recommended at its meeting on December 5, 1955, that it be reconstituted as the Prosthetics Research Board with a rotating membership. This recommendation was approved by the President of the Academy, and has been put into effect. General F. S. Strong, Jr., has agreed to serve as Chairman of the Board until June 1957. Colonel Gerald R. Tyler has been appointed Executive Director and A. Bennett Wilson, Jr., Executive Secretary, the position he held under the old Advisory Committee. The members of the Board are as follows:

CHESTER C. HADDAN, Gaines Orthopedic Appliances Inc.
PAUL E. KLOPSTEG, Associate Director, National Science Foundation
PAUL B. MAGNUSON, Orthopedic Specialist
ROBERT R. MCMATH, Director, McMath-Hulburt Observatory
C. LESLIE MITCHELL, Henry Ford Hospital
HOWARD A. RUSK, New York University–Bellevue Medical Center
AUGUSTUS THORNDIKE, Harvard University
TRACY S. VOORHEES, Lawyer, Washington, D. C.

SYMPOSIUM ON ASPECTS OF DEEP SEA RESEARCH

Under the joint sponsorship of the Office of Naval Research and the Academy–Research Council Committee on Undersea Warfare, the Symposium on Aspects of Deep Sea Research was convened at the Academy–Research Council building on February 29 and March 1. The two-day pro-

gram under the chairmanship of Columbus O'D. Iselin, associate professor of physical oceanography at Harvard University and Senior Physical Oceanographer at Woods Hole Oceanographic Institution, was concerned with discussions of what types of information are desired regarding the depths of the ocean and how this information can be best obtained.

Speakers were drawn from oceanography and certain peripheral fields. Among those in attendance from other countries were George E. R. Deacon, Director of the National Institute of Oceanography, England; H. B. Hachey, Chief Oceanographer of the Canadian Joint Committee on Oceanography; and Jacques Piccard, Director of the Executive Committee of the Committee for Oceanographic Research by the Bathyscaphe *Trieste*.

Mr. Piccard's paper describing the construction and utilization of the bathyscaphe to carry observers and instruments to ocean depths greater than 12,000 feet was a highlight of the program.

At the conclusion of the meeting the following resolution received the unanimous approval of those in attendance:

The careful design and repeated testing of the bathyscaphe has clearly demonstrated the technical feasibility of operating manned vehicles safely at great depths in the ocean.

The scientific implications of this capability are far-reaching.

We, as individuals interested in the scientific exploration of the deep sea, wish to go on record as favoring the immediate initiation of a national program, aimed at obtaining for the United States undersea vehicles capable of transporting men and their instruments to the great depths of the oceans.

GRANTS FOR CANCER RESEARCH

The American Cancer Society, upon the recommendation of the Committee on Growth, recently awarded 327 grants-in-aid in support of cancer research. The grants went to 127 institutions in 35 States, the District of Columbia, and Puerto Rico.

This year the Committee and its 13 advisory panels considered 445 applications requesting a total of $4,236,982. The Society made available $2,635,000 to support approved projects. With these funds the Committee recommended approval of 74 percent of the applications for 62 percent of the total funds requested.

During the past five years, the funds requested have increased from $2,865,831 to $4,236,982, the number of applications from 339 to 445, and the average size of grant from $6,630 to $8,058. This year nearly one-fourth of the applications were received from investigators who had never sought support through the Committee before.

As in the past, the fields of chemotherapy and endocrinology received more support than any other disciplines. For several years there has been increasing activity in the field of virology and immunology, and this year it supplanted metabolism and nutrition in third place.

STAFF APPOINTMENTS

The Division of Engineering and Industrial Research has announced the appointment of **David K. Felbeck** as Executive Director of the Committees on Ship Steel and Ship Structural Design, which provide advisory guidance for the materials and design research programs of the interagency Ship Structure Committee. Dr. Felbeck received his D.Sc. degree in mechanical engineering from Massachusetts Institute of Technology in 1952 and was a Fulbright lecturer at the Technical University of Delft, The Netherlands, during 1952–53. Before coming to the Academy–Research Council, he was assistant professor of mechanical engineering at the Massachusetts Institute of Technology.

The Maritime Cargo Transportation Conference announces the appointment of **Arthur W. Friedberg** as a Transportation Analyst to replace **Donald K. Pollock** who resigned on December 31, 1955. Before coming to the Academy–Research Council, Mr. Friedberg was associated with Georgetown University's Transportation School.

The Committee on International Exchange of Persons announces the appointment of **Dean Albertson** as Assistant to the Executive Secretary of the Committee. Dr. Albertson received his Ph.D. degree from Columbia University in 1955 and for the past eight years has been Assistant Director of the Oral History Project of Columbia University.

RECORD OF MEETINGS

January	
4	Highway Research Board Award Committee
	Ship Structure Committee and Committee on Ship Structural Design, Joint Meeting
5	Committee on Ship Structural Design
5–6	Advisory Committee on Vapor Barrier Materials
6	Federal Construction Council, Operating Committee
6–7	Advisory Committee on the Use of Doctoral Data Records
9	Subcommittee on Vector Control
10	Subcommittee on Waste Disposal
12	Federal Construction Council, Task Group on Selection of Windows
13	Federal Construction Council, Task Group on Cooling Towers and Evaporative Condensers
	American Geological Institute, Executive Committee
	Materials Advisory Board, Special Policy Committee
13–14	Biology Council Committee on Educational Policies, Subcommittee on Precollege Education
14	Subcommittee on Purine and Pyrimidine Derivatives, *New York City*
14–15	Committee on Child Development, *Ithaca, N. Y.*
	Screening Committee for Postdoctoral Fellowships in Mathematics
16	Subcommittee on the Skeletal System
16–17	Screening Committee for Postdoctoral Fellowships in Biology and Agriculture
17–20	Highway Research Board, 35th Annual Meeting
18–19	Advisory Committee on Concrete Brick
19	Division of Anthropology and Psychology, Committee on Primary Records
20	High Temperature Alloys Panel, Sub-panel on Alloys to 1200° F., *Pittsburgh*
	United States National Committee for the International Geophysical Year, Executive Committee
	Agricultural Board, Executive Committee, *Chicago*
	Committee Advisory to the Office of Ordnance Research
	Highway Research Board, Executive Committee
21	Committee on an International Directory of Psychologists, *Cambridge, Mass.*

January	
21	Screening Committee for Postdoctoral Fellowships in Anthropology and Psychology
22	Committee on International Relations in Psychology, *Cambridge, Mass.*
23	Committee on Animal Nutrition, Subcommittee on Feed Adjuvants, *Chicago*
23–24	Screening Committee for Postdoctoral Fellowships in the Medical Sciences
24–28	Committee on Range and Pasture Problems, *Chicago*
25	USA National Committee, International Geographical Union
	Subcommittee on Co-enzymes, *Baltimore*
25–26	Screening Committee for Postdoctoral Fellowships in Chemistry and Chemical Technology
26	High Temperature Alloys Panel, Sub-panel on Vacuum Melting and Production, *New York City*
	Division of Physical Sciences, Joint Committee for the Improvement of Science and Mathematics Teaching
26–27	Division of Physical Sciences and University of Pittsburgh, Joint Conference on the Need for High School Physics, *Pittsburgh*
27	Food Protection Committee, Subcommittee on Toxicology
	Subcommittee on Shelter and Clothing
27–28	Planning Conference on the Evaluation of Pharmacotherapy in Psychiatry
28–29	Biology Council Committee on Educational Policies, Subcommittee on College Education
	Screening Committee for Postdoctoral Fellowships in the Physical Sciences
29–30	Committee on Growth, Executive Committee, *Williamsburg, Va.*
30	Special Committee on Natural Resources
30–31	Committee on Astronomy, Advisory to Office of Naval Research
	Committee on Drug Addiction and Narcotics
31	AASHO Road Test, Statistical Panel, *Chicago*
31–Feb. 2	Advisory Committee on Anchorage of Exterior Walls

February	
1	Federal Construction Council, Task Group on Resilient Floor Finishes
2	Federal Construction Council, Task Group on Maintenance and Operating Problems Effected by Design and Construction
	Subcommittee on Trauma
3	Subcommittee on Shock and Panel on Plasma
4	Committee on Symbols, Nomenclature, and Units, *New York City*
7–8	Advisory Committee on Hot-Water Heaters
8	Ship Structure Committee and Committee on Ship Steel, Joint Meeting
9	Committee on Ship Steel
	Prevention of Deterioration Center, Committee on Storage and Retrieval of Information
	Federal Construction Council, Operating Committee
10	Subcommittee on Food Supply
	Committee on Nuclear Science, Subcommittee on Beta and Gamma Ray Measurements and Standards, *Oak Ridge, Tenn.*
11	Office of International Relations, Policy Committee
	Division of Earth Sciences, Executive Committee
12	National Academy of Sciences–National Research Council, Governing Board
13	Committee on International Relations in Psychology
	Committee on Radiology
14	Committee on Fire Research
15	National Science Foundation Senior Postdoctoral Fellowship Evaluation Committees for the Biological Sciences and the Physical Sciences
15–16	Committee on Waste Disposal, *Oak Ridge, Tenn.*
16	National Science Foundation Senior Postdoctoral Fellowship Evaluation Board
	High Temperature Alloys Panel, Sub-panel on Coatings and Ceramics
	Federal Construction Council, Task Group on Cooling Towers and Evaporative Condensers
	Ad hoc Panel on Transfusion Problems
	Ad hoc Panel on the Establishment of a Hemoglobin Standard
17	Subcommittee on Blood and Related Problems

February	
17–18	Medical Fellowship Board
18	Committee on International Relations in Anthropology, *Philadelphia*
	Committee on Mathematics, Advisory to the Office of Naval Research
19	Ad hoc Committee, International Union of Biochemistry
20	Prosthetics Research Board, *New York City*
	Highway Research Board, Ad hoc Committee on Photogrammetry
	Subcommittee on Water Supply
	Food Protection Committee, Ad hoc Subcommittee to Determine the Practical Equivalent of Zero
	National Science Foundation Final Graduate Evaluation Board
21	Subcommittee on Co-enzymes, *Baltimore*
	Screening Committee for Postdoctoral Fellowships in Engineering and Industrial Research
	Screening Committee for Postdoctoral Fellowships in Convergent Fields
21–23	National Science Foundation Graduate Fellowship Evaluation Panels for Anthropology and Psychology, Biological Sciences, Chemistry, Earth Sciences, Engineering, Mathematics, Physical Sciences, Research, and Convergent Fields
22	National Science Foundation Postdoctoral Fellowship Evaluation Board
24	Building Research Institute, Window and Glass Conference Program Committee
	National Science Foundation Final Graduate Evaluation Board
25–26	Committee on Disaster Studies
26	Committee on Archaeological Identification
26–27	Screening Committee for Postdoctoral Fellowships in the Earth Sciences
27	Subcommittee on Anesthesia
28	Committee on Medicine and Surgery
	High Temperature Alloys Panel, Sub-panel on Materials for Use above 1700° F., *Pittsburgh*
	Division of Medical Sciences, Executive Committee
29	Subcommittee on the Cutaneous System
29–Mar. 1	Committee on Undersea Warfare, Symposium on Aspects of Deep Sea Research

NEW PUBLICATIONS

Announcement of 1956–1957 Program for India under the Fulbright Act, University Lecturing, Advanced Research, (Conference Board of Associated Research Councils, Committee on International Exchange of Persons), 1956. 4 p.

Building Research Institute. *Metal Curtain Walls.* Koehler, C. R., *ed.* December 1955. (National Academy of Sciences–National Research Council. Publication 378.) 190 p. $4.00.

Cohen, B. M. and M. Z. Cooper. *A Follow-up Study of World War II Prisoners of War.* VA Medical Monograph. (National Research Council, Follow-up Agency.) Superintendent of Documents. Washington, 1954. 81 p. $1.50.

Effects of Traffic Control on Street Capacity. (National Academy of Sciences–National Research Council. Publication 365. Highway Research Board Bulletin 112.) 50 p. $0.90.

Hertig, A. T. and Hazel Mansell. *Tumors of the Female Sex Organs. Part 1. Hydatidiform Mole and Choriocarcinoma.* Washington, 1956. Armed Forces Institute of Pathology. (*Atlas of Tumor Pathology.* Sec. IX, fasc. 33.) 63 p., illus. $1.00.

Industrial Research Laboratories of the United States. James F. Mauk, *comp.* Washington, 1956. (National Academy of Sciences–National Research Council. Publication 379.) 10th ed., 550 p. $10.00.

Long, E. R. and Seymour Jablon. *Tuberculosis in the Army of the United States in World War II. An Epidemiological Study with an Evaluation of X-ray Screening.* VA Medical Monograph. (National Research Council, Follow-up Agency.) Superintendent of Documents. Washington, 1955. 88 p. $1.50.

National Academy of Sciences–National Research Council. Division of Mathematics. *Report of the Subcommittee of the United States National Committee for Liaison with the International Commission on Mathematical Instruction.* Saunders MacLane, Chairman. June 30, 1955. 20 p., mimeo.

National Research Council. Committee on Ship Steel. *An Appraisal of the Properties and Methods of Production of Laminated or Composite Ship Steel Plate.* 9 p. and 4 appendices. [1956.]

National Research Council. Agricultural Research Institute. *Proceedings of the Conference on Problems Involved in the Study, Evaluation, and Application of Pesticides.* October 19, 1955. Washington, 1956. 20 p., mimeo.

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Palmer, Archie M. *Administration of Medical and Pharmaceutical Patents.* Washington, 1955. (National Academy of Sciences–National Research Council. Publication 375.) 69 p. $2.00.

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Subcommittee on Fluorosis Problems. *The Fluorosis Problem in Livestock Production. A Report of the Committee on Animal Nutrition.* September 1955. (National Academy of Sciences–National Research Council. Publication 381.) 17 p., illus. $1.00.

Way, K. et al. *Nuclear Level Schemes.* June 1955. United States Atomic Energy Commission, TID 5300. (Nuclear Data Project, Committee on Tables of Constants and Numerical Data. National Research Council.) Superintendent of Documents, Washington, 1955. 221 p. $1.75.

Notice of Academy Meetings

NATIONAL ACADEMY OF SCIENCES

Annual Meeting, Washington, D. C., April 23–25, 1956

NATIONAL ACADEMY OF SCIENCES—NATIONAL RESEARCH COUNCIL

Governing Board, Washington, D. C., April 22, 1956

Governing Board, Washington, D. C., June 17, 1956

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